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(54) Title: METHOD OF OPERATING A RADIO TRANSCEIVER AND RADIO TRANSCEIVER

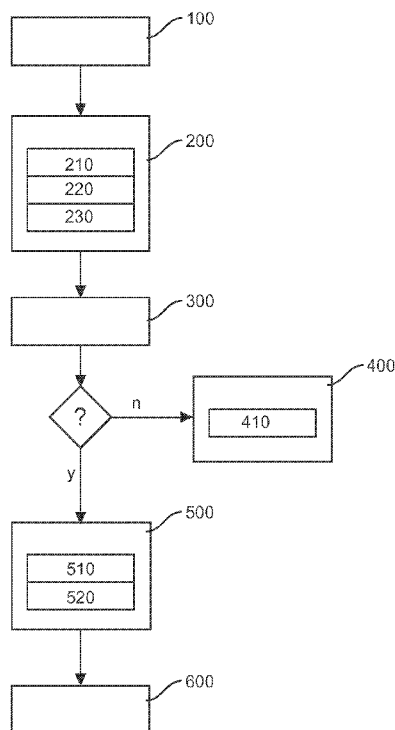


Fig.1

(57) Abstract: A first radio transceiver is operated in a way that it performs the following steps: scanning a frequency band having a plurality of channels, assessing the channels of the frequency band to determine non-occupied channels, checking, whether at least one first beacon transmitted by a second radio transceiver is present in the frequency band indicating, whether at least one non-occupied channel is present, transmitting a second beacon indicating, whether at least one non-occupied channel is present, if no first beacon was found in the scanned frequency band, and determining at least one channel for communication if at least one first beacon is found in the scanned frequency band.



ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV,
MC, MK, MT, NL, NO, PL, PT, RO, SE, SI, SK, SM,
TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW,
ML, MR, NE, SN, TD, TG).

— *as to applicant's entitlement to apply for and be granted
a patent (Rule 4.17(ii))*

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Declarations under Rule 4.17:

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Method of operating a radio transceiver and radio transceiver

FIELD OF THE INVENTION

The present invention relates to a method of operating a radio transceiver and a radio transceiver.

5 BACKGROUND OF THE INVENTION

EP 1 750 466 A1 discloses a method and a system for dynamic spectrum allocation, which is used in a communication network. The communication network includes user terminals, base stations and a policy server. The area which is covered by the communication network is sensed with respect to the usage of the spectrum. Based on the results of sensing of the spectrum, the policy server produces policies for the usage of the spectrum for the communication network. Furthermore, policies produced by the policy server are broadcasted to the user terminals.

However, the communication network does not support peer-to-peer communication between the user terminals. The user terminals merely receive the spectrum usage policies via a broadcast.

SUMMARY OF THE INVENTION

It is an object of the present invention to establish a reliable peer-to-peer communication between radio transceivers.

This object is solved by a method of operating a radio transceiver according to claim 1 and a radio transceiver according to claim 7.

Accordingly, the peer-to-peer communication should not be disturbed by other radio transmissions. A reasonable decision for a reliable and not disturbed channel on which a peer-to-peer communication can take place shall be made without relying on a policy server of a mobile radio network and/or without relying on services which are performed in other parts of the network to which the radio transceivers may belong.

Therefore, a method of operating a first radio transceiver is provided. A frequency band having a plurality of channels is scanned by the first radio transceiver. The channels of the frequency band are assessed to determine non-occupied channels. It is checked whether at least one first beacon transmitted by a second radio transceiver is present in the frequency band indicating whether at least one non-

occupied channel is present. A second beacon is transmitted by a first radio transceiver indicating whether at least one non-occupied channel is present if no first beacon was found in the scanned frequency band. At least one channel for communication is determined if at least one first beacon is found in a scanned
5 frequency band.

The first radio transceiver can for example be incorporated into a mobile terminal, which can be part of a mobile radio communication system. To establish a peer-to-peer communication to at least one further radio transceiver, the radio transceivers can be operated according to the above method. Several radio
10 transceivers may communicate with each other via a peer-to-peer communication on different channels that belong to a frequency band. For example, two radio transceivers can communicate with each other via one channel of said frequency band. Beside the radio transceivers, there can be other transmitters, like base stations of a mobile radio system and television broadcasting units, which may occupy some
15 of the channels that belong to the frequency band. The scanning of the frequency band can help a radio transceiver to decide whether a channel of the considered frequency band is occupied. Based on the scanning results, the radio transceiver can assess which channels of the frequency band are not occupied. Based on, for example, a noise level, the radio transceiver may also assess the quality for a possible
20 transmission via each of the channels. The assessment results may be stored in a table. The results may comprise information for each channel regarding whether a channel is occupied or not, how each channel is occupied, the noise level, the quality for a possible transmission, the reachable throughput and the like. Particularly, the information on occupied channels can be stored.

Parts of the information in the table, for example, the numbers of the non-occupied channels, can be transmitted by the radio receiver via a beacon. Generally a beacon is a signal to indicate that the transmitter of the beacon is able to communicate. The radio transceiver may also check, whether at least one beacon is transmitted by another radio transceiver in the considered frequency band. The beacon
25 can contain different kinds of information, particularly whether at least one non-occupied channel is present. Preferably, the beacon contains the numbers of the channels that are found to be non-occupied. The information on the channels contained in the beacon is based on the scanning of the respective radio transceiver that has transmitted the respective beacon. In case the radio transceiver did not find a
30

beacon in the scanned frequency band, it will transmit a beacon that contains information that results from the scanning of that radio transceiver. In case a beacon is found in the considered frequency band, the information contained in that beacon, together with the information resulting from the own scanning of the frequency band, can be used to determine at least one reasonable channel for a peer-to-peer communication between the radio transceiver that has transmitted the beacon and the radio transceiver that has received the beacon. The beacon may include a list of free or occupied frequencies and a list of frequencies on which an answer is expected. The transmission of a beacon can be repeated several times, possibly with some intermission time.

According to an aspect of the invention, the step of assessing the channels may comprise the step of measuring the power contained in each channel, comparing the measured power with a threshold, and/or demodulating each channel.

One aim of assessing the channel is to create a table which may characterize each channel in different views, for example, if a channel is occupied or non-occupied or if a channel is suited for peer-to-peer communication between different radio transceivers or in which way a channel is occupied. A channel can be occupied by a transmission of a TV broadcasting unit or a mobile radio transmission unit or the like. Several methods can be used to perform this kind of assessment. For example the power of the received signal in each channel can be measured, and/or the measured power can be compared with a threshold, and/or the received signal in each signal can be demodulated, for example according to a specific receiver structure that is used in the systems that may occupy a channel or that is used to demodulate in the peer-to-peer communication to be established.

According to an aspect of the invention, the step of transmitting a second beacon comprises transmitting a list of channels on which a first radio transceiver expects an answer if no first beacon is recognized in said frequency band. That further information on the channels can be used by another radio transceiver to decide on which channel a peer-to-peer communication should be established.

According to a further aspect of the invention, the step of determining at least one channel comprises determining at least one channel based on throughput requirements if at least one beacon is recognized in the scanned frequency band. Different kinds of information on the peer-to-peer communication can be used to determine a specific channel for a peer-to-peer communication. It would be

particularly reasonable to decide for a specific channel in view of the required throughput that reflects the amount of data which shall be transmitted via that channel.

According to an aspect of the invention, a communication with at least one further radio transceiver is initiated on the at least one channel determined in the step of determining at least one channel for communication. As soon as the first radio transceiver has determined the channel or the channels on which a peer-to-peer communication shall take place, the communication can be initiated. For example, the first radio transceiver can transmit a signal to at least one further radio transceiver on the channel or the channels which was determined by the first radio transceiver in the step of determining at least one channel for communication. The use of more than one channel may be reasonable to meet respective throughput requirements.

The invention also relates to a radio transceiver. The radio transceiver comprises a scanning unit for scanning a frequency band having a plurality of channels; an assessing unit for assessing the channels of a frequency band to determine non-occupied channels; a checking unit for checking whether at least one first beacon transmitted by a further radio transceiver is present in the frequency band indicating whether at least one non-occupied channel is presented; a transmitter unit for transmitting a second beacon indication whether at least one non-occupied channel is present if no first beacon was found in the scanned frequency band; and a determining unit for determining at least one channel for communication if at least one first beacon is found in the scanning frequency band. Generally, the described radio transceiver comprises units that enable the operation according to the methods of operating a radio transceiver.

Such a radio transceiver is particularly suited to be operated by a method to operate a radio transceiver as described above. With it, the transceiver can be used to establish a reliable peer-to-peer communication.

According to an aspect of the invention, the transmitting unit of the radio transceiver is also adapted to transmit a list of channels on which the radio transceiver expects an answer if no beacon is recognized in the frequency band. Such a list can help or improve the determination of a channel for a reliable peer-to-peer communication.

According to an aspect of the invention, the determining unit of the radio transceiver is also adapted to form at least one intersection of a first list of

channels and at least one further list of channels to determine at least one channel if at least one first beacon is recognized in the scanned frequency band. Forming an intersection between two lists of channels is an effective and efficient way to determine a channel that is suited for a peer-to-peer communication.

5 According to an aspect of the invention, the radio transceiver further comprises an initiating unit for initiating a communication with at least one further radio transceiver in the at least one channel determined by the determining unit. The initiating unit may actually initiate the peer-to-peer communication. Thereby the initiating unit may also follow a certain protocol, defining the rules of the further
10 communication.

 According to an aspect of the invention, a mobile terminal comprises a radio transceiver according to the present invention. Such a mobile terminal can establish peer-to-peer communications to at least one further mobile terminal. For a communication between two mobile terminals, it is thus not necessary that the mobile
15 terminal communicates with a base station to establish a communication to another mobile terminal. Furthermore, a policy server that is located at the side of a base station in a mobile radio system and that determines frequency allocation is not required to allocate a frequency for a peer-to-peer communication between two
20 mobile terminals.

20 It shall be understood that the method of operating the first radio transceiver of claim 1, the radio transceiver of claim 7, the mobile terminal of claim 11, the radio communication system of claim 12, the system on-chip of claim 13, the computer program product of claim 14 and the signal of claim 15 have similar and/or identical preferred embodiments as defined in the dependent claims.

25 It shall be understood that a preferred embodiment of the invention can also be any combination of the dependent claims with the respective independent claim.

BRIEF DESCRIPTION OF THE DRAWINGS

30 These and other aspects of the invention will be apparent from and elucidated with reference to the embodiments described hereinafter. In the following drawings:

 Fig. 1 shows a flow chart of a method of operating a radio transceiver according to a first embodiment ,

Fig. 2 shows a block diagram of a radio transceiver according to a second embodiment,

Fig. 3 shows a scenario of a radio communication system according to a third embodiment,

5 Fig. 4 shows a second scenario of a radio communication system according to a fourth embodiment, and

Fig. 5 shows a third scenario of a radio communication system according to a fifth embodiment.

10 DETAILED DESCRIPTION OF EMBODIMENTS

Fig. 1 shows a flow chart of a method of operating a first radio transceiver according to a first embodiment. A first radio transceiver first performs scanning according to step 100. A frequency band having a plurality of channels is scanned by the first radio transceiver. Then the first radio transceiver assesses the
15 results of the scan according to step 200. The channels of the frequency band are assessed to determine non-occupied channels. The step of assessing the channels may comprise the step 210. Here, the power contained in each channel is measured. In step 220, the measured power is compared with a threshold and/or in step 230, each channel is demodulated. In step 300 it is checked whether at least one first beacon
20 transmitted by a second radio transceiver is present in the frequency band indicating whether at least one non-occupied channel is present. If no beacon is present, the first radio transceiver transmits according to step 400 a second beacon indicating whether at least one non-occupied channel is present. The step 400 may also comprise step 410. Here, a list of channels on which the first radio transceiver expects an answer is
25 transmitted. If at least one first beacon is found in the scanned frequency band, a communication channel is determined according to step 500. At least one channel for communication is determined. The step 500 may also comprise the step 510. Here, at least one intersection of the first list of channels and at least one further list of channels is formed to determine at least one channel for communication and/or in step
30 520, at least one channel for communication is determined based on throughput requirements. Finally, the communication will be initiated on the determined channel according to step 600. A communication with at least one further radio transceiver is initiated on the at least one channel determined in step 500.

Fig. 2 shows a block diagram of a radio transceiver 10 according to a second embodiment. The radio transceiver comprises a scanning unit 11, an assessing unit 12, a checking unit 13, a transmitting unit 14, a determining unit 15 and an initiating unit 16. The radio transceiver 10 can be adapted to perform the operation according to the first embodiment of Fig. 1. Generally, the scanning unit 11 scans the frequency band. Then the assessing unit 12 determines the occupied and non-occupied channels. The checking unit 13 checks, whether a first beacon was received during the scanning of the frequency band. If no first beacon was received, then a second beacon will be transmitted by the transmitting unit 14. If a first beacon was received, then the determining unit 15 will determine the channel on which a communication between at least two radio transceivers will take place and the initiating unit 16 will initiate the communication between at least the two radio transceivers on the channel determined in the determining unit 15. The channel is determined by intersecting the list of non-occupied channels contained in the received first beacon and the list that resulted from the scanning of the first radio transceiver and by selecting one of the channels that is non-occupied in both lists.

Fig. 3 shows a first scenario of a radio communication system according to a third embodiment. It shows a first mobile terminal 7 and a second mobile terminal 8, which are each provided with a radio transceiver according to the present invention. Furthermore, a base station 6 is present. The base station 6, the first mobile terminals 7, and the second mobile terminal 8 can receive and transmit data on the channels 1 to 5. The base station 6 transmits data on the channels 1, 3 and 4. The first mobile terminal 7 scans the frequency band which comprises the channels 1 to 5. The first mobile terminal 7 finds that the channels 1, 3 and 4 are occupied and that the channels 2 and 5 are non-occupied. Since the first mobile terminal 7 did not find a first beacon during scanning, it transmits a second beacon, preferably a low power beacon, on for example channel 2. When the second mobile terminal 8 becomes active, it will start scanning the frequency band and, according to the scenario, it will find that the channels 1, 3 and 4 are occupied while the channels 2 and 5 are available. Furthermore, the second mobile terminal 8 will receive the second beacon of the first mobile terminal 7 that states that the first mobile terminal 7 found that channels 2 and 5 are available. The second mobile terminal 8 receives the second beacon on channel 2. The mobile terminal 8 can then transmit an answer that states that the second mobile terminal 8 is ready for communicating via channels 2 and/or 5. The

communication between the first mobile terminal 7 and the second mobile terminal 8 is then initiated via channels 2 and/or 5 depending on a specific requirement, for example throughput requirements. Optionally, the decision for a channel is made randomly. The principles of the third embodiment can also be applied to wireless
5 local area network devices which may comprise a radio transceiver according to the second embodiment.

Fig. 4 shows a scenario of a radio communication system according to a fourth embodiment. The radio communication system comprises a first mobile terminal 7, a second mobile terminal 8, a base station 6, communication channels 1 to
10 5 and a wall 9. The second mobile terminal 8 is placed in the shadow of the wall 9, which shall indicate that the first mobile terminal 7 does not receive the transmissions of the base station 6. The base station transmits on the channels 1, 3 and 4. The first mobile terminal 7 scans the frequency bands and finds that channels 1, 3 and 4 are occupied while channels 2 and 5 are non-occupied. The first mobile terminal 7
15 chooses channel 2 for transmitting a second beacon since the mobile terminal 7 did not find a first beacon during the scanning of the frequency band. When the second mobile terminal 8 becomes active, it starts scanning the frequency band. Since the second mobile terminal 8 is located in the shadow of the wall 9, it will find that none of the channels is occupied, i.e. channels 1 to 5 are non-occupied. Furthermore, it will
20 find the second beacon in channel 2 of the first mobile terminal 7, which states that channels 2 and 5 are available. After performing an intersection between the list of non-occupied channels in the second beacon and the list resulting from the own scan, the second mobile terminal 8 sends an answer that it is ready for communication via the channels 2 and 5. Then the peer-to-peer communication between the mobile
25 terminal 7 and the second mobile terminal 8 is initiated via channels 2 and/or 5. The decision between channel 2 and 5 is for example done randomly or dependent on throughput needs. The principles of the fourth embodiment can also be applied to wireless local area network devices which may comprise a radio transceiver according to the second embodiment.

30 Fig. 5 shows a third scenario of a radio communication system according to a fifth embodiment. The radio communication system comprises a first mobile terminal 7, a second mobile terminal 8, a base station 6, and the channels 1 to 5. The base station is transmitting on channels 1, 3 and 4. The first mobile terminal 7 is located in the shadow of a wall 9, which shall indicate that the first mobile terminal

7 does not receive the transmissions of the base station 6.. The first mobile terminal 7 scans the frequency band and finds that none of the channels 1 to 5 is occupied, i.e. channels 1 to 5 are non-occupied. The mobile terminal 7 then chooses channel 3 for transmitting a second beacon, since the first mobile terminal did not receive a first beacon during the scanning of the frequency band. When the second mobile terminal 8 becomes active, it starts scanning the frequency bands. It will find that the channels 1, 3 and 4 are occupied while channels 2 and 5 are non-occupied. It will further find the second beacon of the first mobile terminal 7 on channel 3 which states that channels 1 to 5 are available. Then the second mobile terminal 8 performs an intersection of the received list of non-occupied channels and the list resulting from the own scan. Based on that result the second mobile terminal 8 transmits an answer stating that it is ready for communication via channels 2 and/or 5. The peer-to-peer communication between the first mobile terminal 7 and the second mobile terminal 8 is then initiated via channels 2 and/or 5. The decision between channel 2 and 5 can be done randomly or depending on for example throughput needs. The selection of the terminals 2 and 5 is performed via an intersection of the information of the received beacon and the result of the own scan of a respective mobile terminal. The principles of the fifth embodiment can also be applied to wireless local area network devices which may comprise a radio transceiver according to the second embodiment.

In an aspect of the present invention, a radio communication system comprises at least two radio transceivers according to the present invention.

In an aspect of the present invention, a system on-chip comprises a radio transceiver according to the present invention.

In an aspect of the present invention, a computer program product enabling the carrying out of the method of operating a first radio transceiver is presented.

A system on chip and/or a computer program product are suited to implement at least parts of the method to operate the radio transceiver and the radio transceiver itself according to the present invention.

In a further aspect of the present invention, signals transmitted by a radio transceiver that is operated by the method of operating a first radio transceiver are presented.

It should be noted that the above-mentioned embodiments illustrate rather than limit the invention, and that those skilled in the art will be able to design

many alternative embodiments without departing from the scope of the appended claims. In the claims, any reference signs placed between parentheses shall not be construed as limiting the claim. The word "comprising" does not exclude the presence of elements or steps other than those listed in a claim. The word "a" or "an" preceding
5 an element does not exclude the presence of a plurality of such elements. In the device claim enumerating several means, several of these means can be embodied by one and the same item of hardware. The mere fact that certain measures are recited in mutually different dependent claims does not indicate that a combination of these measures cannot be used to advantage.

10 Furthermore, any reference signs in the claims shall not be constrained as limiting the scope of the claims.

CLAIMS:

1. Method of operating a first radio transceiver (10), comprising the following steps:
 - scanning a frequency band having a plurality of channels by the first
 - 5 radio transceiver (100),
 - assessing the channels of the frequency band to determine non-occupied channels (200),
 - checking, whether at least one first beacon transmitted by a second radio transceiver is present in the frequency band indicating, whether at least one non-
 - 10 occupied channel is present (300),
 - transmitting a second beacon indicating, whether at least one non occupied channel is present, if no first beacon was found in the scanned frequency band (400), and
 - determining at least one channel for communication if at least one
 - 15 first beacon is found in the scanned frequency band (500).
2. Method to operate a radio transceiver (10) according to claim 2, in which step b) at least comprises the steps:
 - measuring the power contained in each channel (210) and/or
 - 20 - comparing the measured power with a threshold (220) and/or
 - demodulating each channel (230).
3. Method to operate a radio transceiver (10) according to claim 1 or 2, in which step d) comprises:
 - 25 - transmitting a list of channels on which the radio transceiver expects an answer if no first beacon is recognized in said frequency band (410).
4. Method to operate a radio transceiver (10) according to claim 1, 2 or 3, in which step e) comprises:
 - 30 - forming at least one intersection of a first list of channels and at least one further list of channels to determine at least one channel for communication if at least one first beacon is recognized in the scanned frequency band (510).

5. Method to operate a radio transceiver (10) according to any one of the claims 1 to 4, in which step e) comprises:

- determining at least one channel for communication in dependence of throughput needs if at least one beacon is recognized in the scanned frequency band (520).

6. Method to operate a radio transceiver according to any one of the claims 1 to 5, which further performs the step:

- initiating a communication with at least one further radio transceiver on the at least one channel determined in step e) (600).

7. Radio transceiver (10) comprising:

- a scanning unit (11) for scanning a frequency band having a plurality of channels,

- an assessing unit (12) for assessing the channels of the frequency band to determine non-occupied channels,

- a checking unit (13) for checking, whether at least one first beacon transmitted by a second radio transceiver is present in the frequency band indicating, whether at least one non-occupied channel is present,

- a transmitting unit (14) for transmitting a second beacon indicating, whether at least one non occupied channel is present, if no first beacon was found in the scanned frequency band, and

- a determining unit (15) for determining at least one channel for communication if at least one first beacon is found in the scanned frequency band.

8. Radio transceiver (10) according to claim 7, wherein

the transmitting unit (14) is adapted to transmit a list of channels on which the radio transceiver expects an answer if no beacon is recognized in the frequency band.

9. Radio transceiver (10) according to claim 7 or 8, wherein

the determining unit (15) is adapted to form at least one intersection of a first list of channels and at least one further list of channels to determine at least one channel if at least one first beacon is recognized in the scanned frequency band.

10. Radio transceiver (10) according to claim 7, 8 or 9, further comprising:
- an initiating unit (16) for initiating a communication with at least one further radio transceiver on the at least one channel determined by the determining unit (15).

5

11. Mobile Terminal (20) comprising a radio transceiver (10) according to claims 7 to 10.

12. Radio communication system (30) comprising at least two radio
10 transceivers (10) according to claim 7 to 10.

13. System on chip (40) comprising a radio transceiver according to anyone of the claims 7 to 10.

15 14. Computer program product (50) enabling the carrying out of the method according to anyone of the claims 1 to 6.

15. Signals (60) transmitted by a radio transceiver (10) that is operated by a method according to anyone of the claims 1 to 6.

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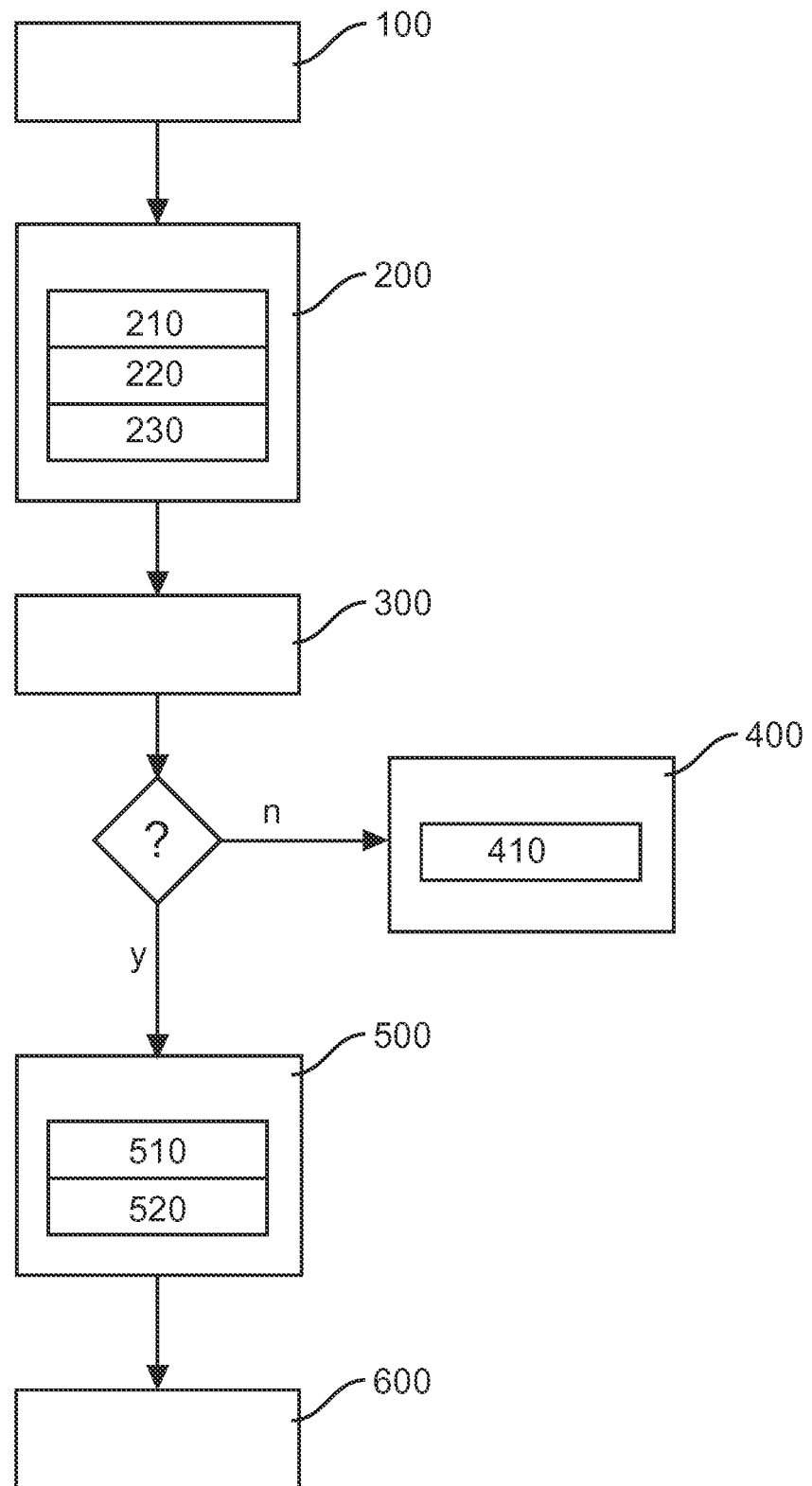


Fig.1

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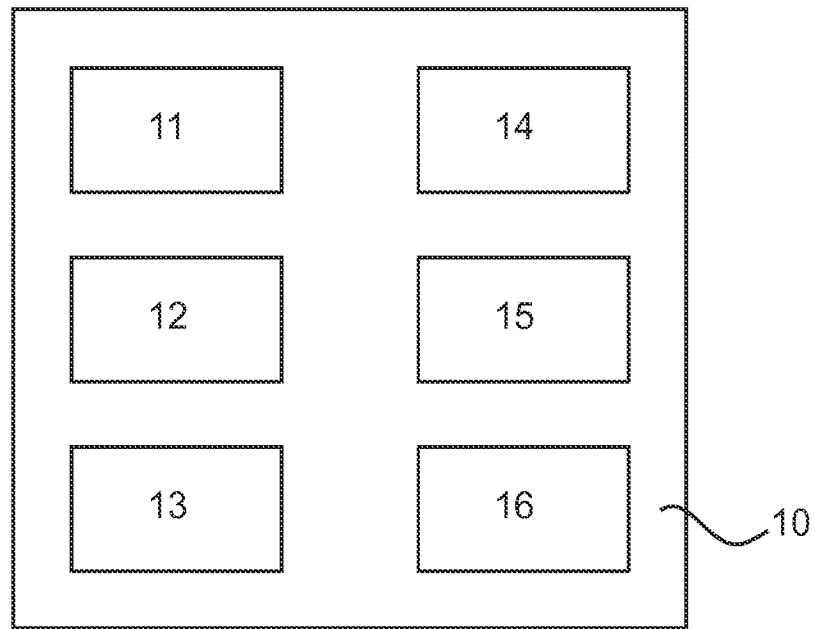


Fig.2

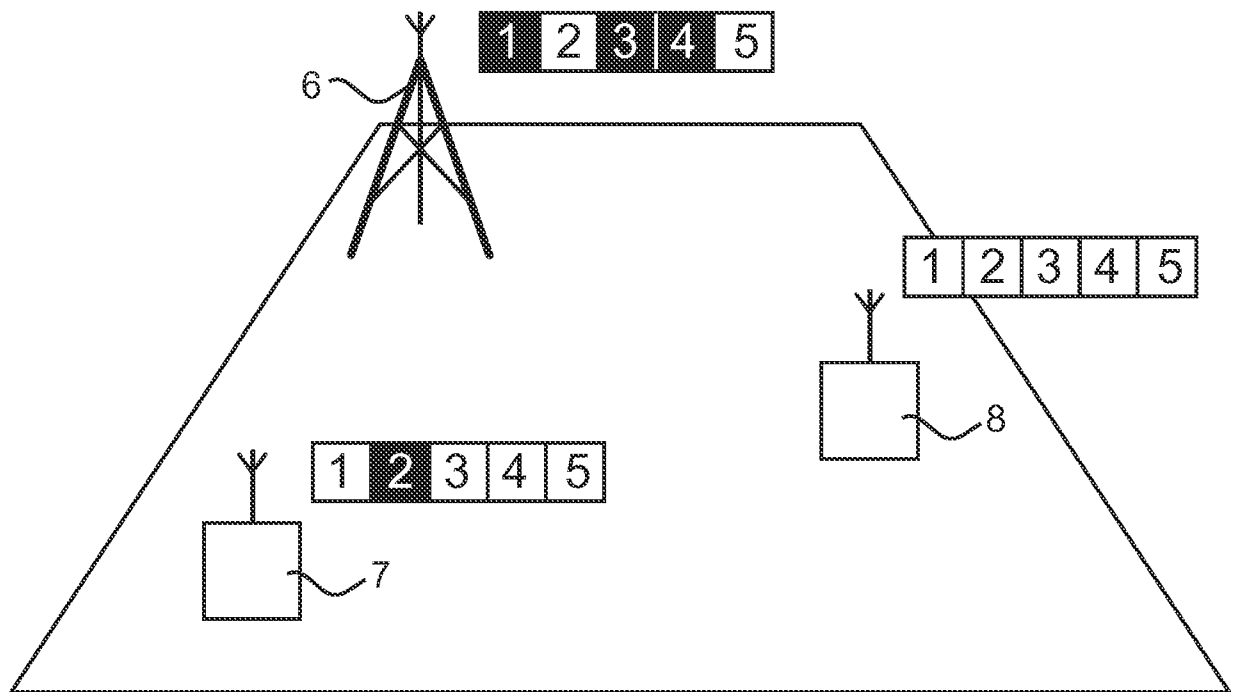


Fig.3

3/3

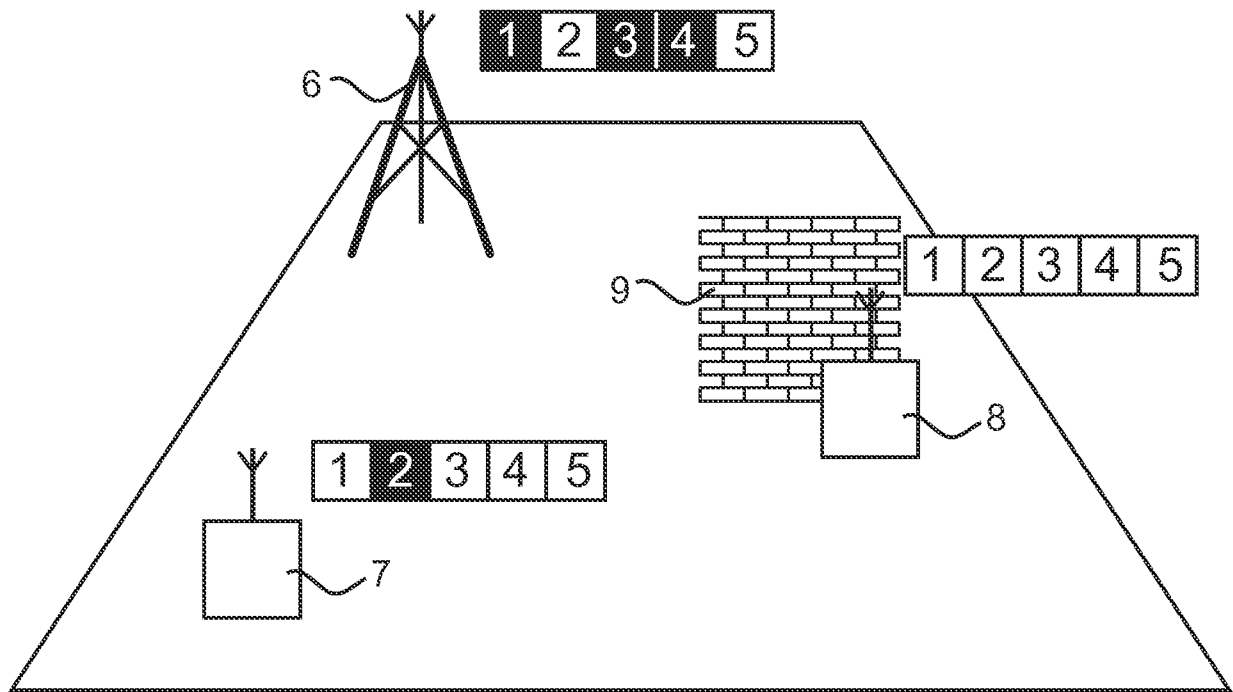


Fig.4

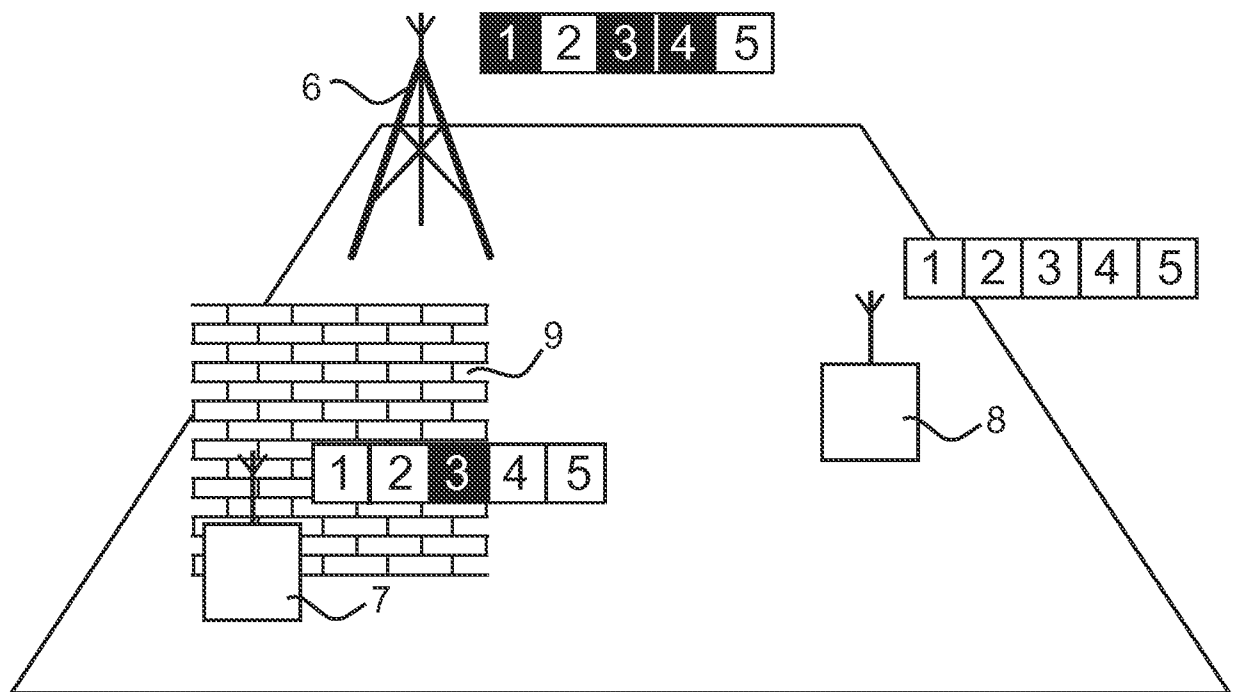


Fig.5

INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2009/053314

A. CLASSIFICATION OF SUBJECT MATTER
INV. H04W16/14

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
H04W

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2007/211680 A1 (LAROKA RAJIV [US] ET AL) 13 September 2007 (2007-09-13) page 3, paragraph 35 - paragraph 36 page 5, paragraph 51 - paragraph 54 page 6, paragraph 68 - paragraph 69 figure 5 figure 8	1-15
A	US 2007/060140 A1 (KANDA TETSUO [JP]) 15 March 2007 (2007-03-15) page 4, paragraph 67 - paragraph 70 page 4, paragraph 75 - page 5, paragraph 81 page 5, paragraph 89 - paragraph 91 ----- -/--	1-15

☒ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents:

A document defining the general state of the art which is not considered to be of particular relevance

E earlier document but published on or after the international filing date

L document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

O document referring to an oral disclosure, use, exhibition or other means

P document published prior to the international filing date but later than the priority date claimed

T later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

X document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

Y document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

Z document member of the same patent family

Date of the actual completion of the international search

4 November 2009

Date of mailing of the international search report

10/11/2009

Name and mailing address of the ISA/

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
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Authorized officer

López García, J

INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2009/053314

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 1 750 466 A (ST MICROELECTRONICS SRL [IT]) 7 February 2007 (2007-02-07) cited in the application column 5, paragraph 26 - column 8, paragraph 44 -----	1-15

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/IB2009/053314

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 2007211680	A1	13-09-2007	NONE	
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